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**TRANSLATION FROM JAPANESE**

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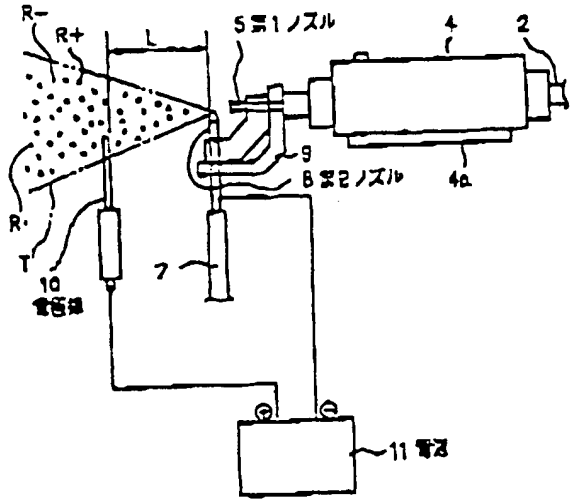
(54) [ Title of the Invention ] **Liquid Spray Device**

(57) [ Summary ]

[Object] To offer a liquid spray device by which fine particles of deodorizing solvent, etc., may be caused to efficiently contact an opposing substance and enhance the effects.

[ Construction ] By applying voltage between a second nozzle 8 and an electrode pole 10, immediately after fine particles of a deodorizing solvent, etc., are sprayed, they are charged positively or negatively, or are changed to a highly active radical state, and these electrically charged fine particles R+ and R- as well as radical fine particles R· may be emitted into the air. According to the charge or electrical state of the object substance (odorous substance), the

emitted charged fine particles R+ and R- as well as radical fine particles R· are pulled in and contact with high efficiency.




Keys: 5. First nozzle, 10. Electrode pole, 8. Second nozzle, 11. Power source

[ Claims ]

[ Claim 1 ] A liquid spray device, which is, characterized by the fact that
in a liquid spray device equipped with a spray nozzle, which emits fine particles of liquid solvent of a deodorizer, disinfectant, etc.,
an electrode is disposed in front of a spray nozzle spray opening, and
a power source is provided which applies a required voltage between the spray nozzle and the electrode.

[ Claim 2 ] A liquid spray device, which is, characterized by the fact that
in a liquid spray device equipped with a spray nozzle, which emits fine particles of liquid solvent of a deodorizer, disinfectant, etc.,
a pair of electrodes is disposed in opposition in front of a spray nozzle spray opening, and
a power source is provided which applies a required voltage between the electrodes.

[ Detailed Description of the Invention ]

[ 0001 ]

[ Field of Industrial Utilization ] The present device is related to a liquid spray device, which emits fine particles of a liquid solvent such as a deodorizer or disinfectant into the air.

[ 0002 ]

[ Prior Art ] In Fig. 2, a conventional liquid spray device of this type is indicated. In this figure, 1 is a vaporization liquid tank which holds a disinfectant vaporization liquid F1; 2 is a vaporization liquid line, one end of which is inserted in vaporization liquid tank 1; 3 is a pump which is placed in vaporization liquid line 2; 4 is a vaporizer whose inlet is connected to the other end of vaporization liquid line 2; 5 is a first nozzle which is connected to an outlet of vaporizer 4; 5 is a first nozzle connected to the outlet of vaporizer 4; 6 is a spray liquid tank which holds a spray liquid (deodorizing solvent) F2; 7 is a spray liquid line one end of which is inserted into spray liquid tank 6; 8 is a second nozzle which is connected to the other end of vaporization liquid line 7; and 9 is a nozzle holder which maintains both nozzles perpendicularly. Vaporizer 4 is equipped with an electrothermal heater 4a and a porous element (the line indicated in the figure); with heat from electrothermal heater 4a, vaporization liquid F1 sent to said porous element can be heated and vaporized, and the vapor therefrom is spurted from the outlet.

[ 0003 ] This liquid spray device is referred to as a dual fluid spray device, and the spraying of spray liquid (deodorizing solvent) F2 is performed in the below manner. Specifically, pump 3 is caused to operate, and when vaporization liquid F1 in vaporization liquid tank 1 is sent to the porous element in vaporizer 4 which is in a heated state, said vaporization liquid F1 is heated and

vaporized, and that vapor is spurted from the tip of first nozzle 5; at the same time that spray liquid F2 in spray liquid tank 6 is sucked up into the tip of second nozzle 8 due to said spurted vapor, it collides with the spurted vapor, is vaporized and spurted out forward.

[ 0004 ]

[ Problems Which the Invention Is Intended to Solve ] In the aforementioned conventional liquid spray device, fine particles of a deodorizing solvent are emitted into the air, and the expected deodorizing effects are obtained by said fine particles being caused to contact with the object substance (odorous substance). However, the problem exists that with conventional devices with which natural contact is expected, it is difficult to cause emitted fine particles to contact an odorous substance with high efficiency, and the expected results cannot be obtained.

[ 0005 ] The present invention takes into account the aforementioned circumstances and offers a liquid spray device whose object allows the effects to be enhanced by causing fine particles of a deodorizing solvent, etc., to efficiently contact an object substance.

[ 0006 ]

[ Means Used to Solve the Aforementioned Problems ] In order to achieve the aforementioned object, in the invention in Claim 1, in a liquid spray device equipped with a spray nozzle which emits fine particles of liquid solvent such as a deodorizer, disinfectant, etc., an electrode is disposed in front of a spray nozzle spray opening, and a power source is provided which applies a required voltage between the spray nozzle and the electrode.

[ 0007 ] Further, in the invention in Claim 2, in a liquid spray device equipped with a spray nozzle which emits fine particles of liquid solvent of a deodorizer, disinfectant, etc., a pair of electrodes is disposed in opposition in front of a spray nozzle spray opening, and a power source is provided which applies a required voltage between both electrodes.

[ 0008 ]

[ Operation of the Invention ] When a voltage is applied between the spray nozzle and electrode in the invention in Claim 1 or between both electrodes in the invention in Claim 2, immediately after the fine particles of liquid solvent which are emitted from the spray nozzle are sprayed, they are positively or negatively charged or are changed into a highly active radical state, and the charged fine particles or radical fine particles are emitted into the air.

[ 0009 ] There are many cases where in the case of an odorous substance, fine particles in a liquid state and that attach to the substance are negatively charged and fine particles in a gas state and that are suspended are positively charged, so the aforementioned charged fine particles are pulled in according to the charge of the odorous substance and contact with high efficiency. Also, highly reactive radical fine particles collide with and contact neutral (non-charged) odorous substances with high efficiency.

[ 0010 ]

[ Working Examples ] In Fig. 1, an example for the present invention is indicated which is applicable to the conventional device indicated in Fig. 2. In Fig. 1, 2 is a vaporization liquid line, 4 is a vaporizer, 4a is an electrothermal heater, 5 is a first nozzle, 7 is a spray liquid line, 8 is a second nozzle, 9 is a nozzle holder, and the construction of portions omitted from the figure is the same as in a conventional device. Both nozzles 5 and 8 are formed from metal pipe material.

[ 0011 ] 10 is an electrode pole made of metal, it is disposed in front of and parallel to second nozzle 8 parallel with interval L, and its tip is positioned in spray region T which forms a conical shape. 11 is a direct current power source, and the negative terminal is connected to second nozzle 8 and the positive terminal to electrode pole 10. The aforementioned interval L can fluctuate due to output from direct current 11, and in the case of an output of 5 to 15 kV, setting to 5 mm or less is desirable.

[ 0012 ] A description of the operation of the aforementioned liquid spray device follows. When a high voltage is applied between second nozzle 8 and electrode pole 10 with the deodorizing solvent in a state of having been sprayed, due to the discharge generated between second nozzle 8 and electrode pole 10, in the process of passing through interval L, the deodorizing solvent fine particles are positively or negatively charged, or are changed to a highly active radical state, and those charged fine particles R+, R- and radical fine particles R· are emitted into the air.

[ 0013 ] In general, among odorous substances, those which are in a fine particle or liquid state or which attached to substances such as, for example, trimethylamine, viridin acetaldehyde, etc., often are charged negatively or are suspended in a gas state; for example, hydrogen sulfide, etc., is often charged positively, so emitted positively charged fine particles R+ are pulled to negatively charged odorous substances, and negatively charged fine particles R- are pulled to positively charged odorous substances, and contact; the expected deodorizing operation is exhibited for each odorous substance. Further, highly reactive radical fine particles R· collide and contact with neutral (non-charged) odorous substances with high efficiency; the expected

deodorizing operation is exhibited.

[0014] In this manner, using the aforementioned liquid spray device, deodorizing solvent fine particles can be positively or negatively charged or emitted into the air as radical fine particles, so positively charged fine particles R+ are caused to contact negatively charged odorous substances and negatively charged fine particles R- are caused to contact positively charged odorous substances with high efficiency; moreover, radical fine particles R· collide with and are caused to contact neutral (non-charged) odorous substances with high efficiency; compared to a conventional device which relies on natural contact, the contact efficiency is markedly enhanced, and superior deodorizing effects may be obtained. Further, through the aforementioned contact, an odorous substance having a positive or negative charge is electrochemically neutralized, and through this, the odorous substance is made inactive and the occurrence of odors can be controlled.

[0015] Fig. 3 indicates a second working example of the present device, and is an application of the present invention to a pressure style liquid spray device. In this figure, 21 is a feed liquid line, 22 is a nozzle adapter connected to an end of feed liquid line 21, and 23 is a spray nozzle provided at the end of nozzle adapter 22. The other end of feed liquid line 21 is inserted in a tank omitted from the figure which holds deodorizing solvent, and along said line, a pump is placed which is omitted from the figure and which pressure feeds the deodorizing solvent into nozzle adapter 22.

[0016] 24 is a pair of electrode poles made from metal disposed in opposition at interval L in front of spray nozzle 23, and each end is positioned in spray region T which forms a conical shape. 25 is a direct current power source, and the negative terminal is connected to one of electrode poles 24 and the positive terminal is connect to the other electrode pole. The aforementioned interval L and the output of direct current power source 11 are similar to that in the previous working example.

[0017] With the aforementioned liquid spray device, deodorizing solvent pressure-fed into nozzle adapter 22 may be sprayed with spray nozzle 23 and sprayed forward. When high voltage of both electrode poles 24 is applied with this spray state, due to the discharge between both electrode poles 24, the deodorizing solvent fine particles are positively or negatively charged in the process of passing through interval L or are changed to a radical state, and these charged fine particles R+, R- and radical fine particles R· are discharged into the air. Other operations and effects are similar to those in the previous working example.

[ 0018 ] In the working examples, the electrode pole may be replaced with an item having a shape other than that of a pole, and the number thereof may be increased as appropriate. In the working examples, the example of spraying deodorizing solvent was given; however, when other solvents such as bactericide solvent, disinfectant solvent, etc., are sprayed, similar operation and effects may be obtained. Further, it goes without saying that the present invention may be applied to various liquid spraying devices other than those in the example figures.

[ 0019 ]

[ Effects of the Invention ] As described in detail above, according to the inventions in Claims 1 and 2, fine particles of liquid solvents such as deodorizer, disinfectant, etc., may be positively or negatively charged or emitted as radical fine particles into the air, so positively charged fine particles contact a negatively charged object substance and negatively charged fine particles contact a positively charged object substance with high efficiency, and radical fine particles collide and contact with a neutral (non-charged) object substance with high efficiency, the contact effects are enhanced markedly compared to a conventional device which relies on natural contact, and superior deodorizing effects may be obtained.

[ Brief Description of the Figures ]

[ Figure 1 ] A figure with the required construction of a liquid spray device showing a working example of the present invention

[ Figure 2 ] A figure with the construction of a liquid spray device showing a convention example.

[ Figure 3 ] A figure with the required construction of a liquid spray device showing another working example of the present invention

Figure 1

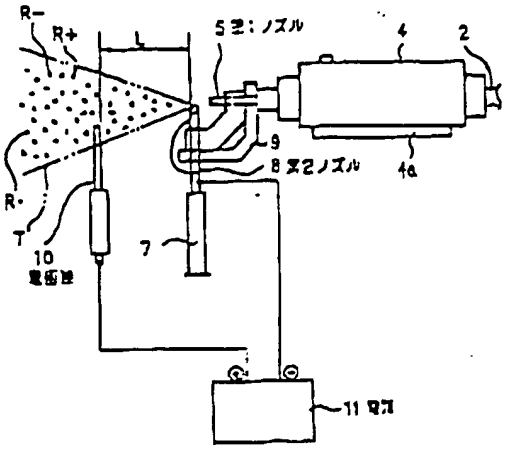



Figure 2

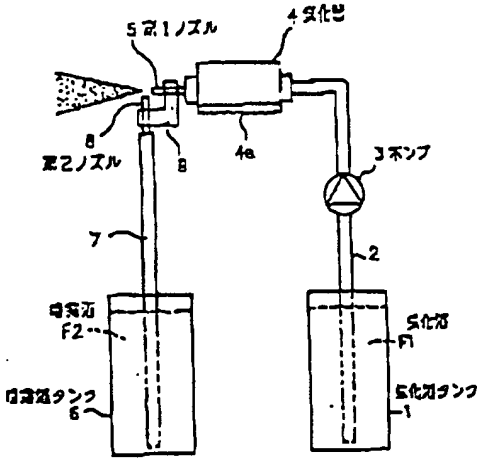
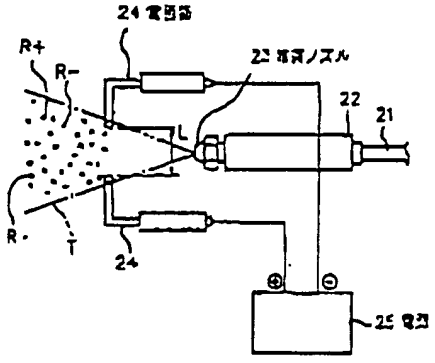



Figure 3




Keys: 1. Vaporization liquid tank 1, 3. Pump, 4. Vaporizer, 5. First nozzle, 6. Spray liquid tank, 8. A second nozzle, 10. An electrode pole, 11. A power source, 23. A spray nozzle, 24. An electrode pole, 25. A power source, F1. Vaporization liquid, F2. Spray liquid